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WHAT IS CLAIMED IS:

- 1 1. An isolated nucleic acid sequence encoding a microtubule motor
2 protein, wherein the protein has the following properties:
3 (i) the protein's activity includes plus end-directed microtubule motor activity; and
4 (ii) the protein has a tail domain that has greater than 60% amino acid sequence
5 identity to a TL- γ tail domain as measured using a sequence comparison algorithm.
- 1 2. An isolated nucleic acid sequence of claim 1, wherein the protein
2 specifically binds to polyclonal antibodies to TL- γ .
- 1 3. An isolated nucleic acid sequence of claim 1, wherein the nucleic
2 acid encodes TL- γ .
- 1 4. An isolated nucleic acid sequence of claim 1, wherein the nucleic
2 acid encodes SEQ ID NO:1.
- 1 5. An isolated nucleic acid sequence of claim 1, wherein the nucleic
2 acid has a nucleotide sequence of SEQ ID NO:2.
- 1 6. An isolated nucleic acid sequence of claim 1, wherein the sequence
2 comparison algorithm is PILEUP.
- 1 7. An isolated nucleic acid sequence of claim 1, wherein the nucleic
2 acid is amplified by primers that selectively hybridize under stringent hybridization
3 conditions to the same sequence as the primer set:
4 5' ATGTCGGGCGGTGGAAATATC 3' (SEQ ID NO:3)
5 5' GAATTCCTGCTTCGCTGTTTCA 3' (SEQ ID NO:4)
6
- 1 8. An isolated nucleic acid sequence of claim 1, wherein the nucleic
2 acid has identity to a TL- γ derived from a hyphal fungi.

1 9. An isolated nucleic acid sequence of claim 8, wherein the nucleic
2 acid has identity to a TL- γ derived from *Thermomyces lanuginosus*.

1 10. An isolated nucleic acid sequence of claim 1, wherein the nucleic
2 acid selectively hybridizes under stringent hybridization conditions to SEQ ID NO:2.

1 11. An expression vector comprising a nucleic acid encoding a
2 microtubule motor protein, wherein the protein has the following properties:
3 (i) the protein's activity includes plus end-directed microtubule motor activity; and
4 (ii) the protein has a tail domain that has greater than 60% amino acid sequence
5 identity to a TL- γ tail domain, as measured using a sequence comparison algorithm.

1 12. A expression vector of claim 11, wherein the protein specifically
binds to polyclonal antibodies to TL- γ .

1 13. A host cell transfected with the vector of claim 11.

1 14. An isolated microtubule motor protein, wherein the protein has the
2 following properties:
3 (i) the protein's activity includes plus end-directed microtubule motor activity; and
4 (ii) the protein has a tail domain that has greater than 60% amino acid sequence
5 identity to a TL- γ core tail domain as measured using a sequence comparison algorithm.

1 15. An isolated protein of claim 14, wherein the protein specifically
2 binds to polyclonal antibodies to TL- γ .

1 16. An isolated protein of claim 14, wherein the protein is TL- γ .

1 17. An isolated protein of claim 14, wherein the protein has an amino
2 acid sequence of SEQ ID NO:1.

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1 18. An isolated protein of claim 14, wherein the protein has identity to
2 a TL- γ derived from a hyphal fungi.

1 19. An isolated protein of claim 18, wherein the protein has identity to
2 a TL-γ derived from *Thermomyces lanuginosus*.

1 20. An isolated protein of claim 14, wherein the protein specifically
2 binds to polyclonal antibodies generated against a tail domain of TL- γ .

1 21 An isolated protein of claim 20, wherein the protein comprises an
2 amino acid sequence of a TL- γ motor domain of SEQ ID NO:1.

1 22. An isolated protein of claim 14, wherein the sequence comparison
2 algorithm is PILEUP.

1 23. An antibody which specifically binds to TL- γ .

1 24. An antibody of claim 23, wherein the antibody specifically binds to
2 a tail domain of TL- γ .

1 25. An antibody of claim 23, wherein the antibody specifically binds to
2 a motor domain of TL-y.

1 26. An antibody of claim 23, wherein the antibody specifically binds to
2 a stalk domain of TL- γ .

1 27. An antibody of claim 23, wherein the antibody is a humanized
2 antibody.

1 28. An antibody of claim 23, wherein the antibody is a chimeric
2 antibody.

(iii) detecting the level of TL- γ specific reagent that selectively associates with the sample.

30. A method of claim 29, wherein the TL- γ specific reagent is selected from the group consisting of: TL- γ specific antibodies, TL- γ specific oligonucleotide primers, and TL- γ nucleic acid probes.

31. A method of claim 29, wherein the sample is from a human.

32. A method of claim 29, wherein the sample is from an animal.

33. A method of claim 29, wherein the TL- γ specific reagent is part of a gene or protein array.

34. A method for screening for modulators of TL- γ , the method comprising the steps of

(i) providing biologically active TL- γ , wherein the TL- γ has the following properties

(a) the protein's activity includes plus end-directed microtubule motor activity; and

(b) the protein has a tail domain that has greater than 60% amino acid sequence identity to a TL- γ tail domain as measured using a sequence comparison algorithm;

(ii) contacting biologically active TL- γ with a candidate agent in a test and control concentration; and

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1 35. A method of claim 34, wherein the protein specifically binds to polyclonal antibodies to TL- γ .

1 36. A method of claim 34, further comprising the step of isolating
2 biologically active TL γ from a cell sample.

1 37. A method of claim 34, wherein the biologically active TL- γ is
2 recombinant.

1 38. A method of claim 34, wherein the biologically active TL- γ has
2 identity to a TL- γ derived from *Thermomyces lanuginosus*.

39. A method of claim 34, wherein the candidate agent is selected from the group consisting of antibodies, proteins, oligonucleotides and small molecules.

1 40. A method of claim 34, wherein the screening occurs in a multi-well
2 plate as part of a high-throughput screen.

41. A method of claim 34, wherein the biologically active TL- γ comprises a motor domain having identity to the motor domain of *Thermomyces lanuginosus* TL- γ .

1 42. A method of claim 34, wherein the biologically active TL- γ
2 comprises an amino acid sequence of a TL- γ motor domain of SEQ ID NO:1.

1 43. A kit for screening for modulators of TL- γ , the kit comprising;
2 (i) a container holding biologically active TL- γ ; and

1 44. A kit of claim 43, wherein the biologically active TL- γ has identity
2 to a TL- γ derived from *Thermomyces lanuginosus*.

1 45. A kit of claim 43, wherein the biologically active TL- γ comprises a
2 motor domain that has identity to the motor domain of *Thermomyces lanuginosus* TL- γ .

1 46. A kit of claim 43, wherein the biologically active TL- γ is
2 recombinant.

1 47. In a computer system, a method of screening for mutations of
2 microtubule motor protein genes, the method comprising the steps of:

(i) entering at least 30 nucleotides of a first nucleic acid sequence encoding a plus end-directed microtubule motor protein having a nucleotide sequence of SEQ ID NO:2 and conservatively modified versions thereof;

6 (ii) comparing the first nucleic acid sequence with a second nucleic acid sequence
7 having substantial identity to the first nucleic acid sequence; and

8 (iii) identifying nucleotide differences between the first and second nucleic acid
9 sequences.

1 48. In a computer system, a method for identifying a three-dimensional
2 structure of microtubule motor proteins, the method comprising the steps of:

(i) entering an amino acid sequence of at least 10 amino acids of a plus end-directed microtubule motor protein or a nucleotide sequence of at least 30 nucleotides of a gene encoding the motor protein, the protein having an amino acid sequence of SEQ ID NO:1 and conservatively modified versions thereof; and

7 (ii) generating a three-dimensional structure of the protein encoded by the
8 amino acid sequence.

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1 49. An isolated nucleic acid comprising a sequence which has greater
2 than 60% sequence identity with SEQ ID NO:2.

1 50. An isolated nucleic acid comprising a sequence which has greater
2 than 70% sequence identity with nucleotides 1-1071 of SEQ ID NO:2.

1 51. An isolated nucleic acid comprising a sequence which has greater
2 than 60% sequence identity with nucleotides 1327-1803 of SEQ ID NO:2.

1 52. An isolated nucleic acid comprising a sequence which has greater
2 than 60% sequence identity with nucleotides 1804-2352 of SEQ ID NO:2.

1 53. An isolated nucleic acid sequence which hybridizes under stringent
2 conditions to a complement of SEQ ID NO/2.

1 54. An isolated nucleic acid sequence which hybridizes under stringent
2 conditions to a complement of nucleotides 1-1071 of SEQ ID NO:2.

1 55. An isolated nucleic acid sequence which hybridizes under stringent
2 conditions to a complement of nucleotides 1327-1803 of SEQ ID NO:2.

1 56. An isolated nucleic acid sequence which hybridizes under stringent
2 conditions to a complement of nucleotides 1804-2352 of SEQ ID NO:2.

1 57. An method for identifying sequence changes among homologs
2 comprising: sequencing the nucleic acid of any one of claims 49-53 and identifying
3 sequence changes compared to the corresponding sequence of SEQ ID NO:2.

1 *2008* 58. A method for identifying agents which binds to TL- γ or portions
2 thereof, wherein a portion refers to the stalk, motor, or tail domain of TL- γ , comprising:
3 adding a candidate agent to TL- γ or a portion thereof and identifying any agents which
4 bind thereto.

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